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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,793	07/12/2006	Masahide Shima	03200PCT	6046

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ST PAUL, MN 551161511

EXAMINER

CHO, JENNIFER Y

ART UNIT	PAPER NUMBER
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1621

MAIL DATE	DELIVERY MODE
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05/24/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/585,793

Applicant(s)

SHIMA ET AL.

Examiner

Jennifer Y. Cho

Art Unit

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 7/12/2006
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Detailed Action

This office action is in response to Applicant's communication filed on 7/12/2006.

Claims 1-5 are pending in this application.

IDS

The information disclosure statement (IDS) filed on 7/12/2006. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Priority Document

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 1/30/2004. It is noted, however, that applicant has not filed a certified copy of the JAPAN 2004-024181 application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tenten et al. (US 5,677,261), in view of Neher et al. (US 5,387,720).

Tenten et al. teaches the preparation of acrylic acid from acrolein by gas-phase catalytic oxidation (column 11, lines 27-28). The gas-phase oxidation reaction is suitable for conversion of propene to acrolein (column 11, line 65) and tert-butanol, isobutene, etc. to methacrolein (column 12, line 8-10). Oxygen is added to a gas for the gas-phase oxidation reaction (column 15, lines 4-9).

Tenten et al. is deficient in that it does not teach the dehydration reaction of glycerol to produce acrolein, in which the glycerol is in the form of an aqueous glycerol solution having a water content of not more than 50% by weight.

Neher et al. teaches the production of acrolein by dehydration of glycerol in the gaseous phase, in which the glycerol content is 10-40% (abstract; column 2, lines 21-35).

Regarding the limitation for the percentage of water in the aqueous glycerol solution, it is the position of the examiner that one of ordinary skill in the art, at the time of the invention, would through routine and normal experimentation determine the

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optimization of this limitation to provide the best effective variable depending on the result desired. Thus it would be obvious in the optimization process, to optimize the water content of the aqueous glycerol solution through routine experimentation. The applicant does not show any unusual and/or unexpected results for the limitations stated. Note that the prior art provides the same effect desired by applicant, the production of acrylic acid in high yield.

Therefore, it would be prima facie obvious to one of ordinary skill in the art at the time of the invention, to utilize the teachings of Tenten et al. and Neher et al. to produce acrylic acid from the dehydration of glycerol, followed by gas phase oxidation of acrolein. Note that the primary reference, Tenten et al., appears to recognize the equivalency of alkenes and alcohols for gas-phase oxidation (column 12, lines 8-10). The expected result would be the production of acrylic acid from glycerol in high yield.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tenten et al. (US 5,677,261), in view of Neher et al. (US 5,387,720), further in view of Unverricht et al. (US 6,403,829).

The teaching of how Neher et al.'s dehydration reaction of glycerol can be used for Tenten et al.'s gas-phase oxidation of acrolein to form acrylic acid was discussed earlier.

However, Tenten et al., in view of Neher et al. is deficient in the sense that it does not teach the production of acrylic acid in a two-stage, tandem-type reactor.

The addition of Unverricht et al. teaches a two-zone tube-bundle reactor (column 10, line 1), which gives a two-stage gas-phase oxidation (column 10, line 27).

Therefore, it would be prima facie obvious to one of ordinary skill in the art at the time of the invention, to utilize the two-zone reactor of Unverricht et al., for Tenten et al. and Neher et al.'s production of acrylic acid from the dehydration of glycerol, followed by gas phase oxidation of acrolein. The expected result would be the production of acrylic acid from glycerol in high yield.

Claims 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tenten et al. (US 5,677,261), in view of Neher et al. (US 5,387,720), further in view of Uchida et al. (US 4,871,700).

The teaching of how Neher et al.'s dehydration reaction of glycerol can be used for Tenten et al.'s gas-phase oxidation of acrolein to form acrylic acid was discussed earlier.

However, Tenten et al., in view of Neher et al. is deficient in the sense that it does not teach the production of acrylic acid in a single-type reactor.

The addition of Uchida et al. teaches a single tubular reactor (column 8, line 41) for the formation of acrylic acid and acrolein (column 8, lines 53-54).

Therefore, it would be prima facie obvious to one of ordinary skill in the art at the time of the invention, to utilize the single tubular reactor of Uchida et al. for Tenten et al. and Neher et al.'s production of acrylic acid from the dehydration of glycerol, followed by

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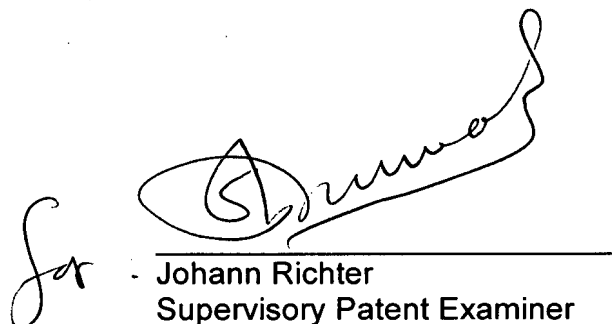
gas phase oxidation of acrolein. The expected result would be the production of acrylic acid from glycerol in high yield.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer Y. Cho whose telephone number is (571) 272 6246. The examiner can normally be reached on 9 AM - 6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann Richter can be reached on (571) 272 0646. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer Cho
Patent Examiner
Art Unit: 1621


Johann Richter
Supervisory Patent Examiner

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